The Story Behind the Real Estate Cycle

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Motivation & Summary

As a mortgage lender and Investor It Is key to understand trends to anticipate deteriorating loan quality and and how rates may Impact future loan volume and ongoing loan standards.

We are looking for trends that correlate to the change In rates as well as the most recent housing crisis. The analysis allowed us to see what trends mostly aligned with he most recent housing crisis to better allow us to adjust our lending criteria to stave off possible future losses as a lender.

Data Clean Up

The Data used needed to have the percentages removed and converted to strings to begin to utilize the data for comparison. Due to the large numbers used In the data many sets of Information needed to be scaled to best show correlation.

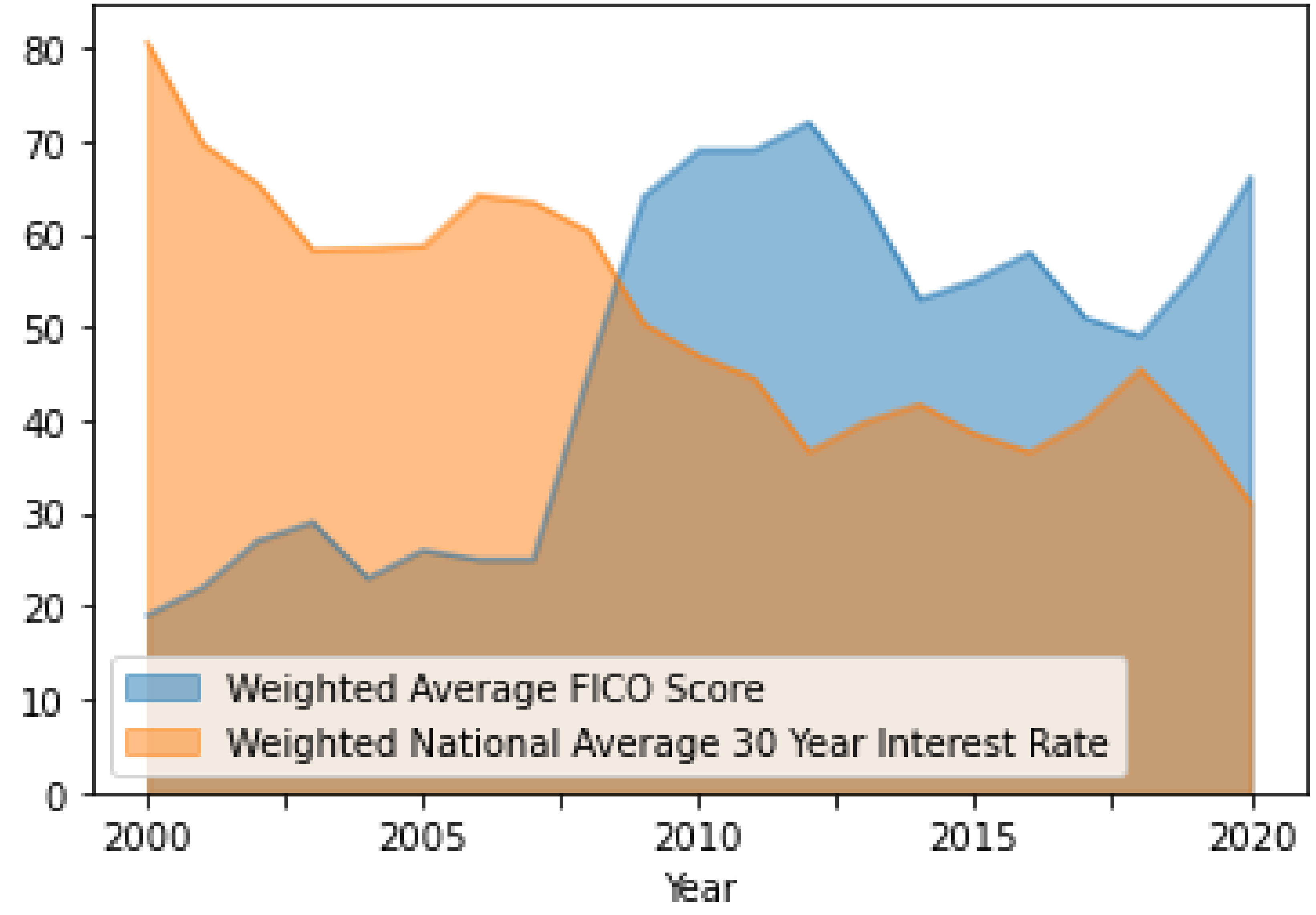
TREND 1

FICO Score

A numeric score used by organizations to determine the likelihood of a person to pay their obligations as they come due

#2 FICO SCORES TO INTEREST RATES

As Rates decrease average FICO score Is going up. We attribute this to the Impact of Interest rates on housing costs preventing those with lower scores and wealth to obtain home loans.

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                                                 WEIGHTED AVERAGE FICO SCORE  \
WEIGHTED AVERAGE FICO SCORE                                         1.000000
WEIGHTED NATIONAL AVERAGE 30 YEAR INTEREST RATE                    -0.863102

                                                 WEIGHTED NATIONAL AVERAGE 30 YEAR INTEREST RATE
WEIGHTED AVERAGE FICO SCORE                                                            -0.863102
WEIGHTED NATIONAL AVERAGE 30 YEAR INTEREST RATE                                         1.000000
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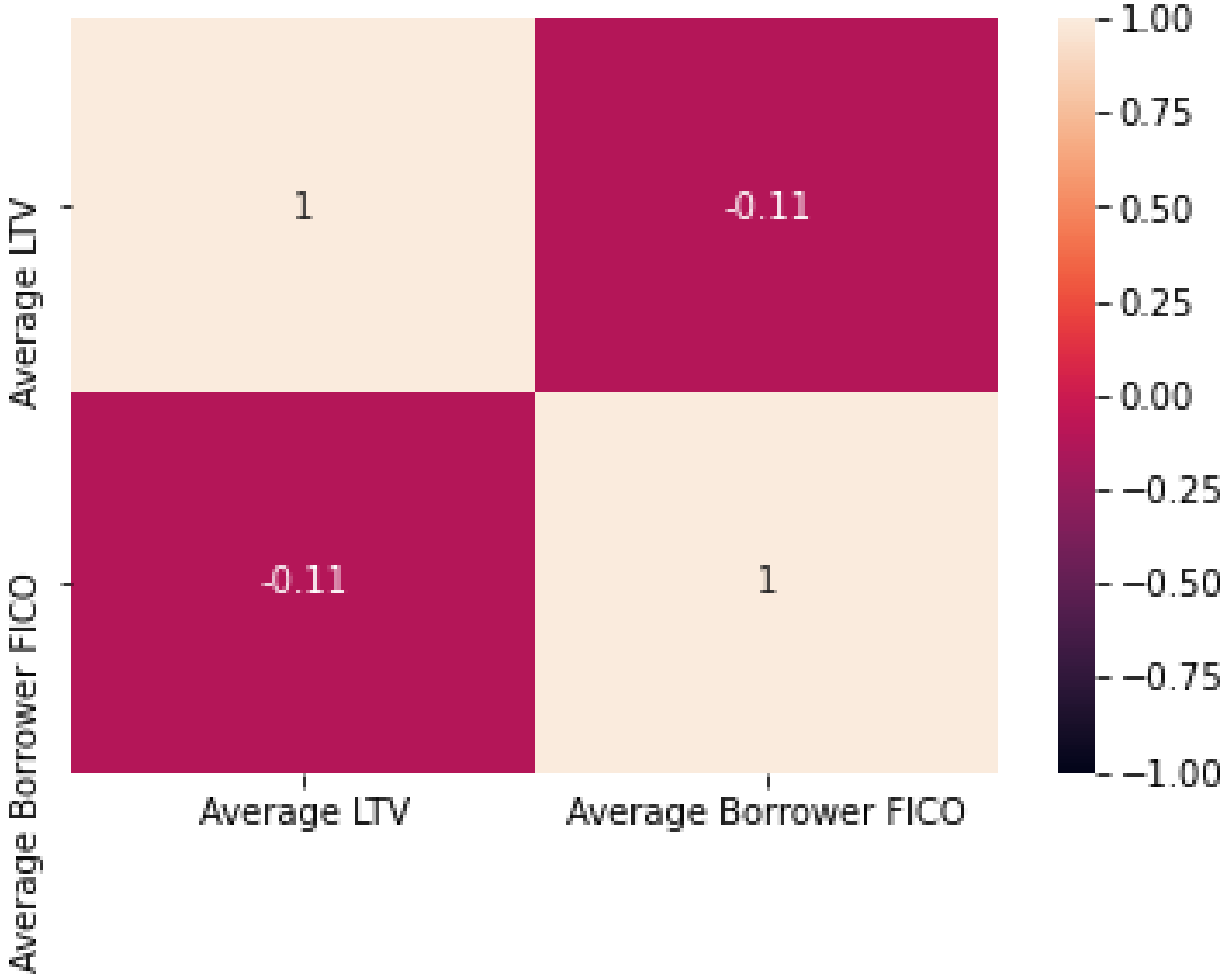
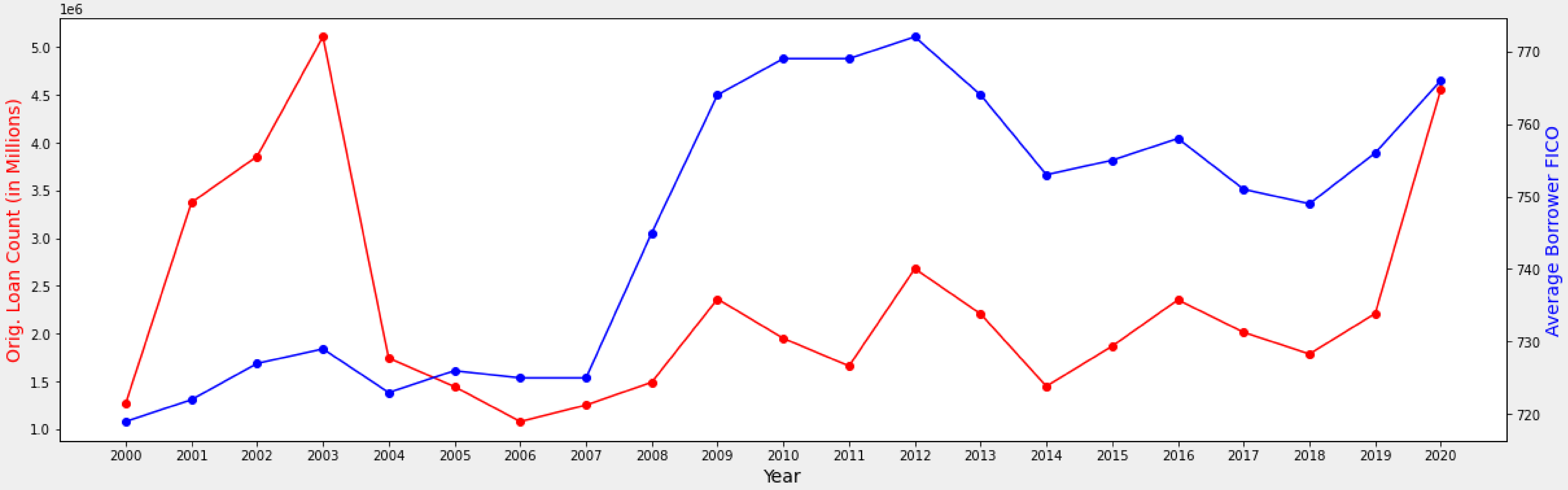
#3 FICO TO LTV

There Is a small correlation between Average FICO Score to LTV.
Showing as those with higher credit scores borrow for home loans they are taking out smaller loans
as a percent to the value of the home purchased.



#13 THE AVERAGE FICO SCORE IN RELATIONSHIP TO THE AVERAGE LOAN BLAANCE TO THE VALUE ONF HOME

We observed that the number of loans Increases as the average FICO score increases.



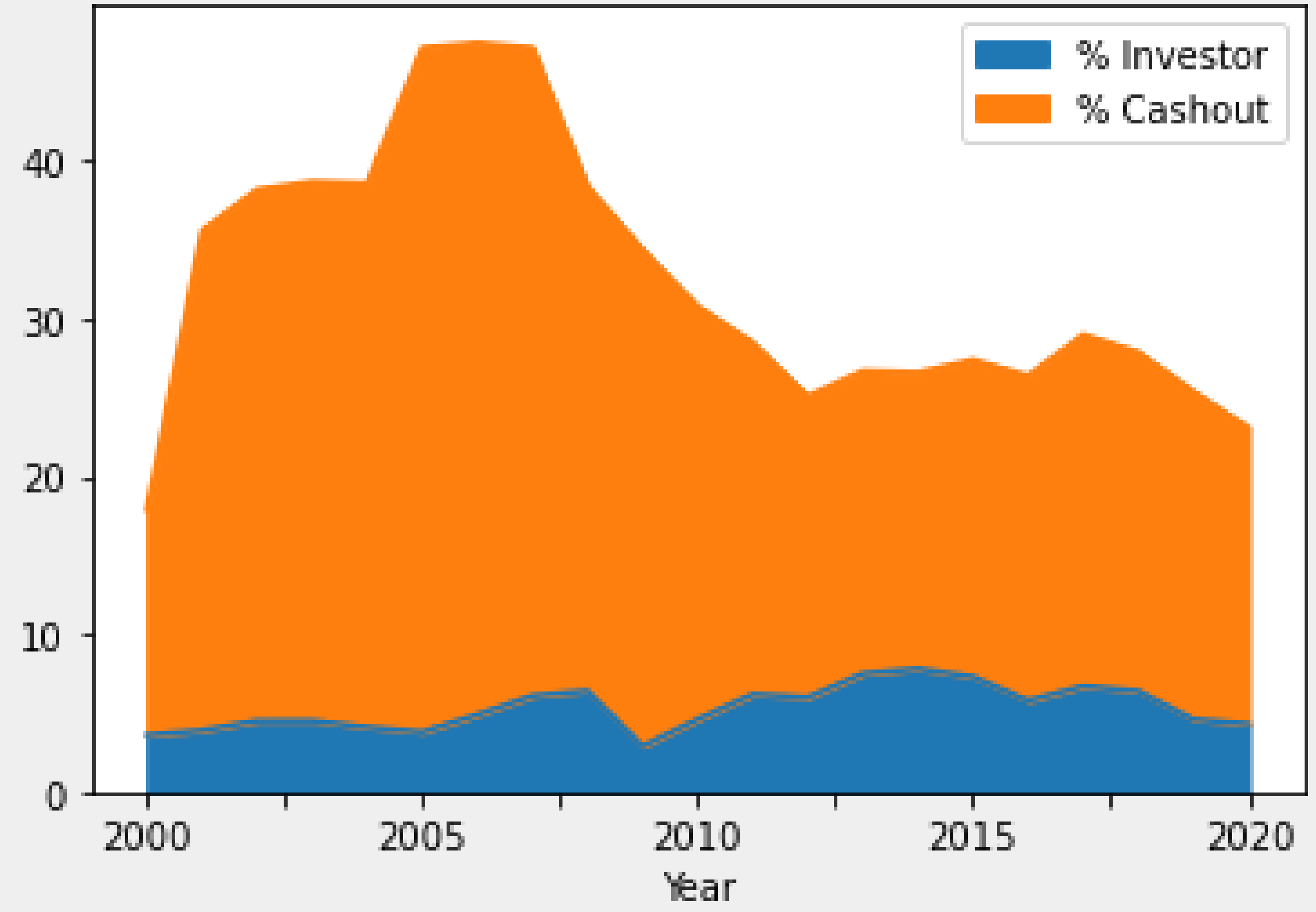
TREND 2

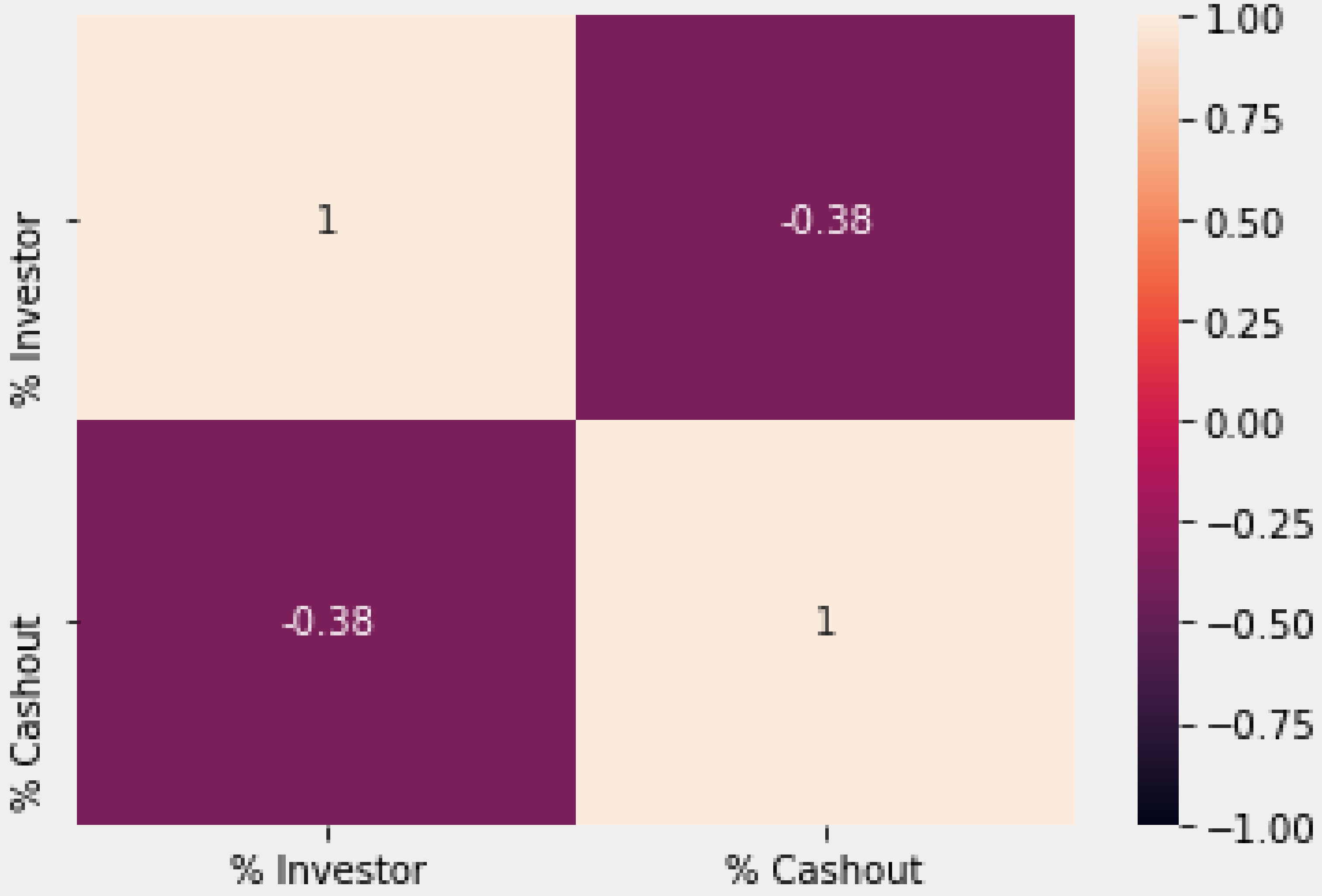
Percentage of Investors

Percentage of loans of home that are not owner occupied

#4 PERCENT OF INVESTORS VERS PERCENT OF LOANS THAT WERE CASH OUT REFINANCIES

The purpose of this graphic Is to determine If the cashour refinance numbers we are seeing are a reflection of Investors utilizing the equity In their Investments.





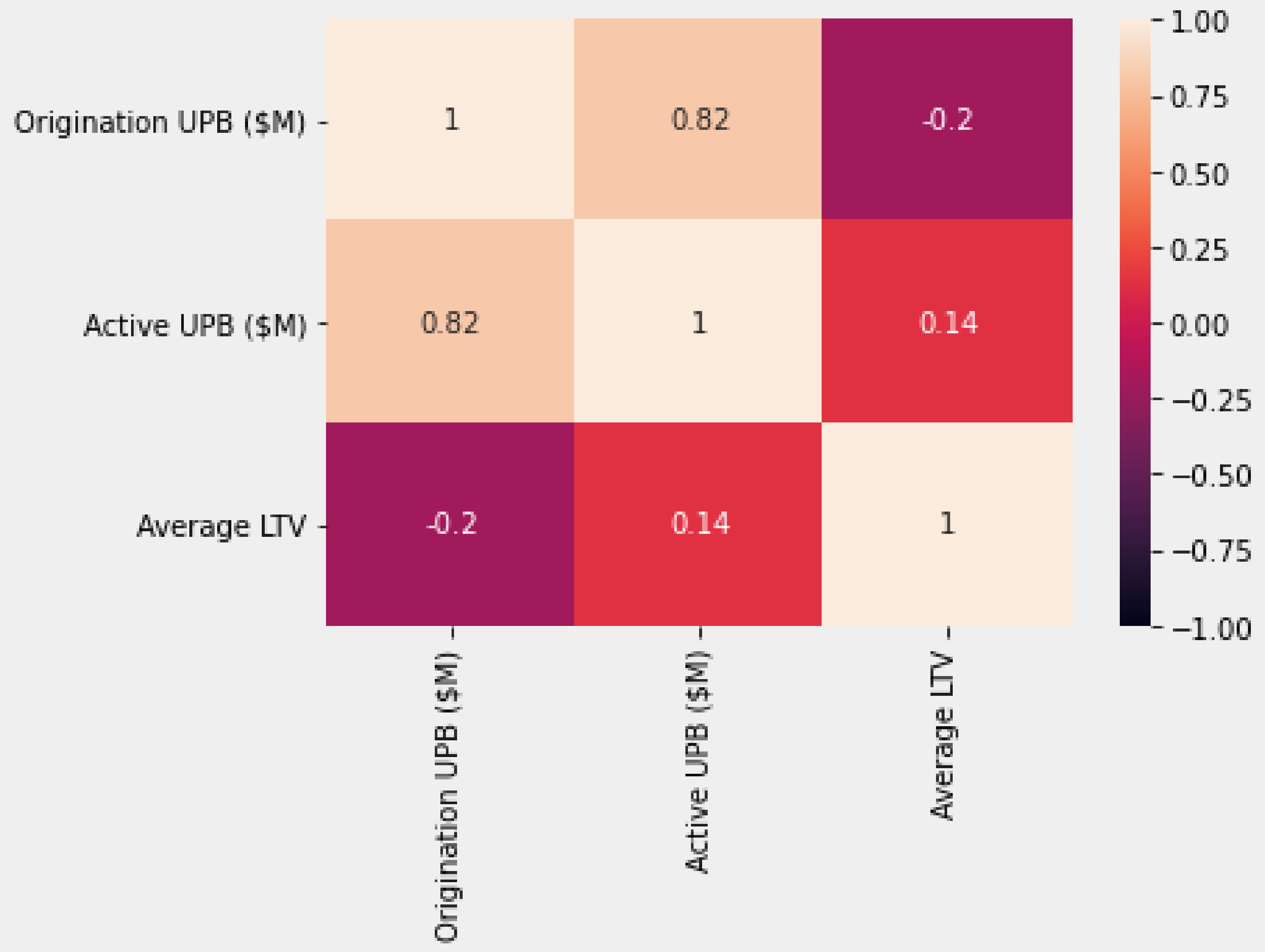
TREND 3

Average Loan to Value

Loan amount as a percentage of the appraised value of the property

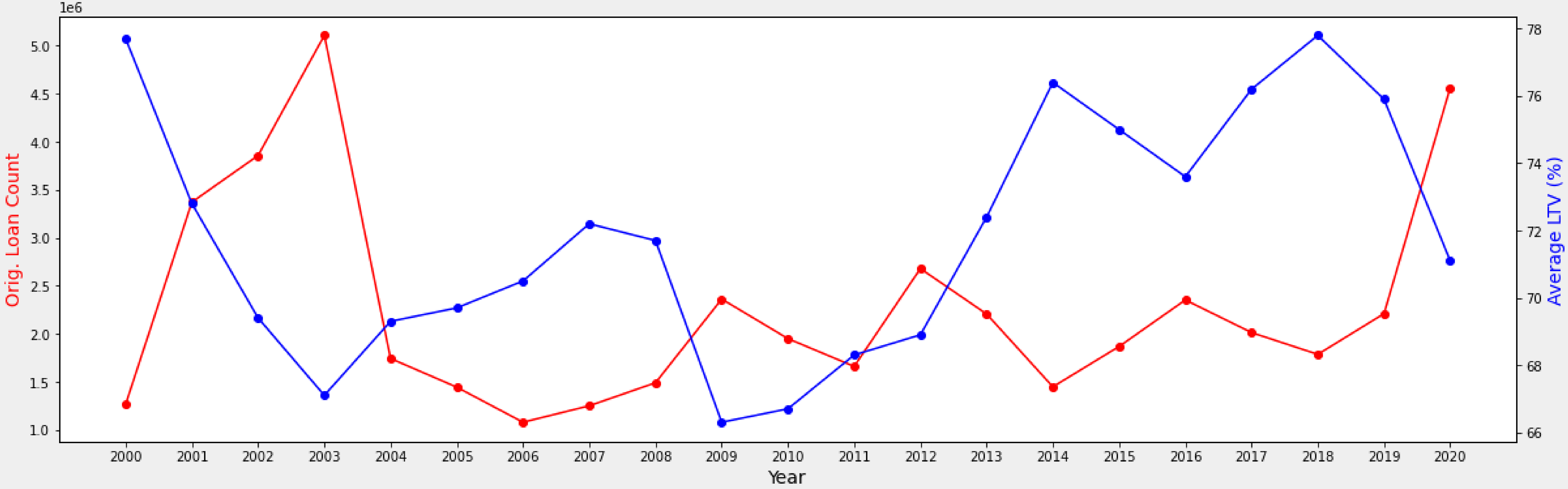
#6 OBSERVATION OF THE CHANGES IN THE UNPAID BALANCE TO THE CHANGE IN LOAN TO VALUE

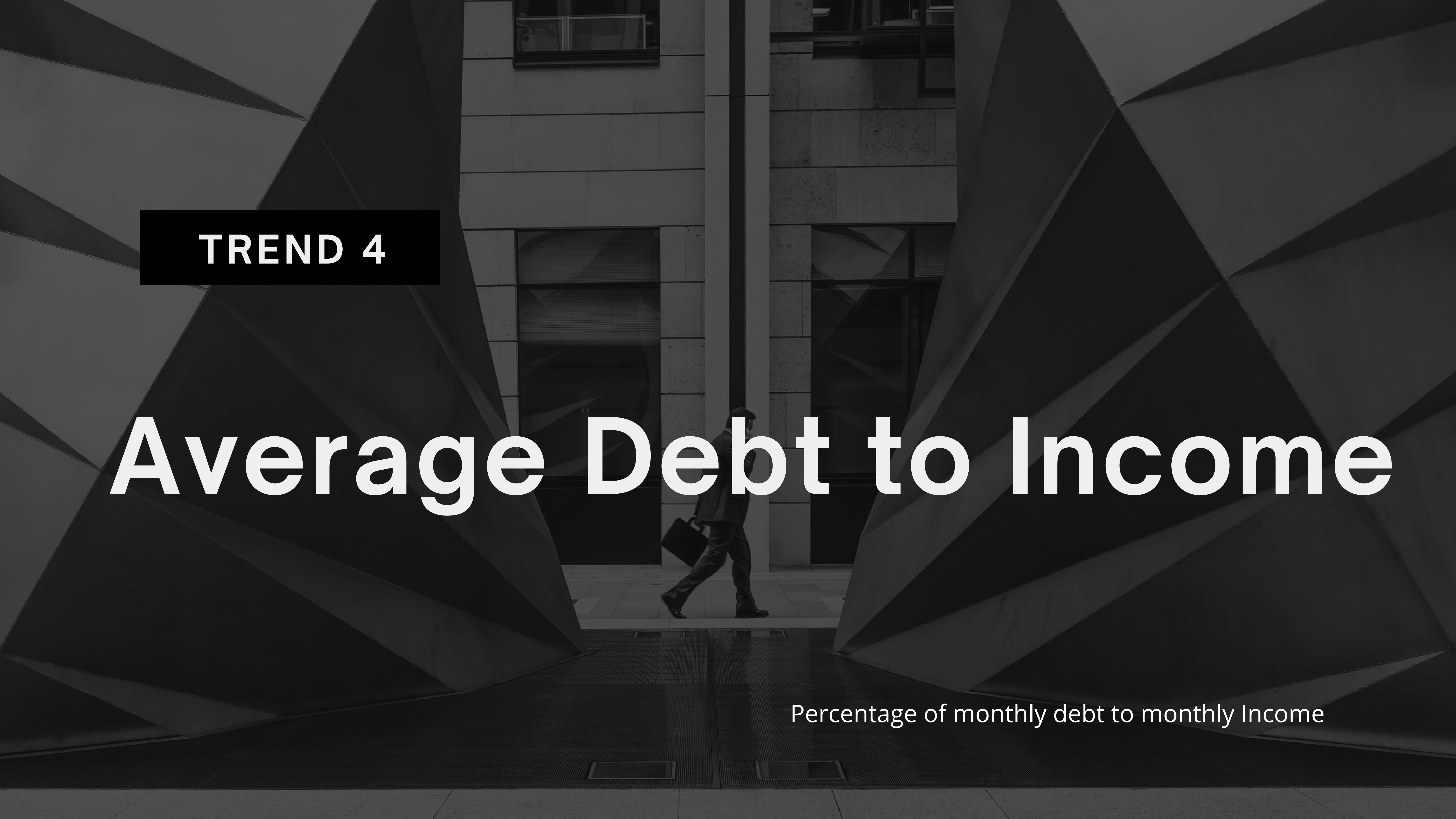
There is a slight inverse and positive correlation, which indicates that higher LTV ties directly unpaid balances.



#12 THE RELATIONSHIP BETWEEN THE AVERAGE LOAN TO VALUE AND THE VOLUME OF LOANS ORIGINATED.

From our data analysis we Identified that at lower rates housing prices rise. This contributes to the highter LTV and thus lower volume due to buyers at the lower end of the market being priced out.





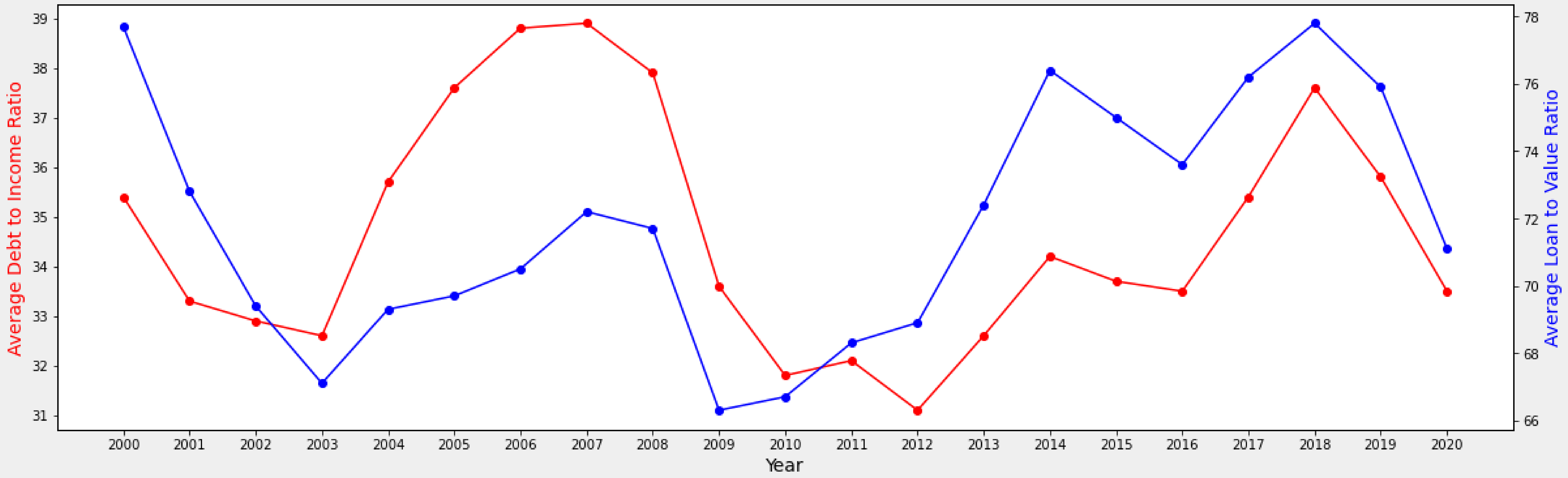
TREND 4

Average Debt to Income

Percentage of monthly debt to monthly Income

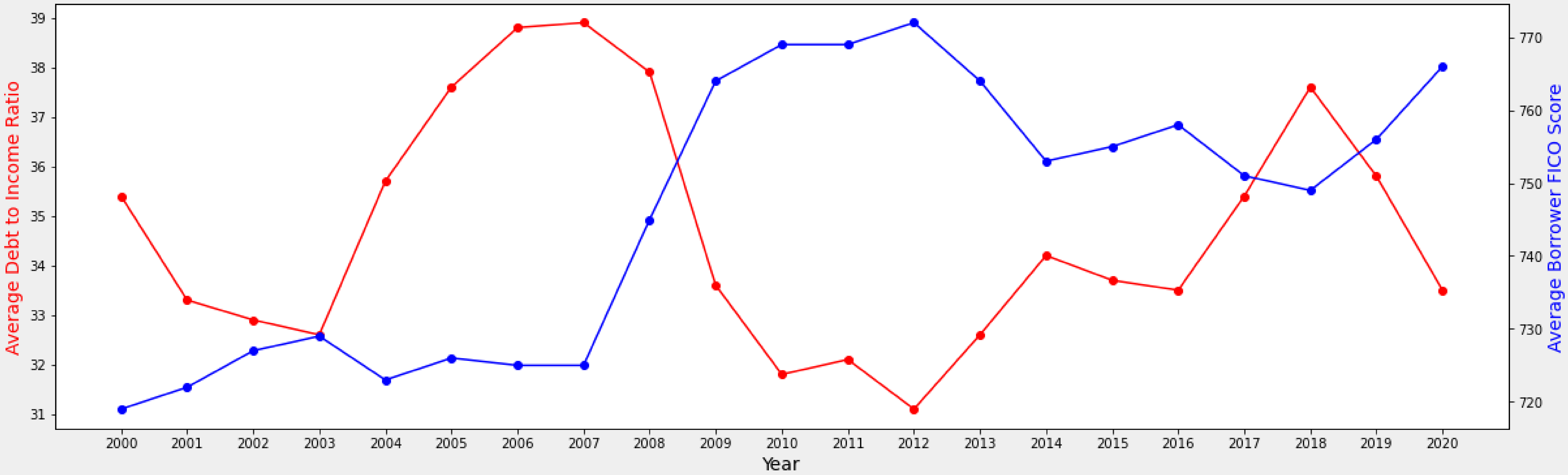
#14 OBSERVING BORROWERS DEBT TO INCOME COMPARIED TO THE LOANS THEY TAKE OUT VERSUS THE VALUE OF THE PROPERTY

The ratios of borrowers who held higher debt to their Income took higher loans to the value of the property they purchased which was In line with our assumptions .



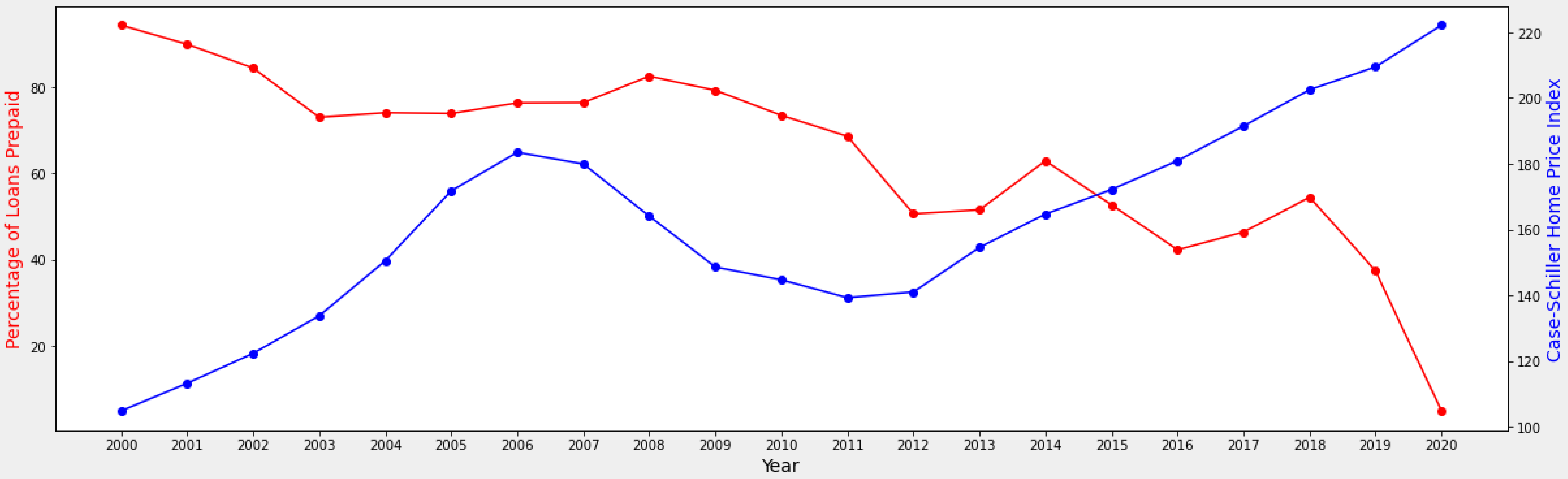
#15 OBSERVING THE AVERAGE DEBT TO INCOME RATIO AS COMPARIED TO THEIR FICO SCORES

We see an Inverse ralationship where the average Debt to Income of borrowers Increases as the average FICO Scores decrease. This makes sense as we see higher risk borrowers needing to stretch their budgets In order to continue to afford the Increasing housing costs.



#11 PERCENTAGE OF HOMEOWNERS WHO PAY OFF THEIR LOANS AS THE PRICE OF THIER HOME INCREASE

There Is an Inverse relationship between people who sell or refinance their homes as the price of their homes Increase. This Is counter to our Initial assumptions although we found In earlier anlaysis that as Interest rates decline (diving up home costs) there Is only a small correlation to prepayments.



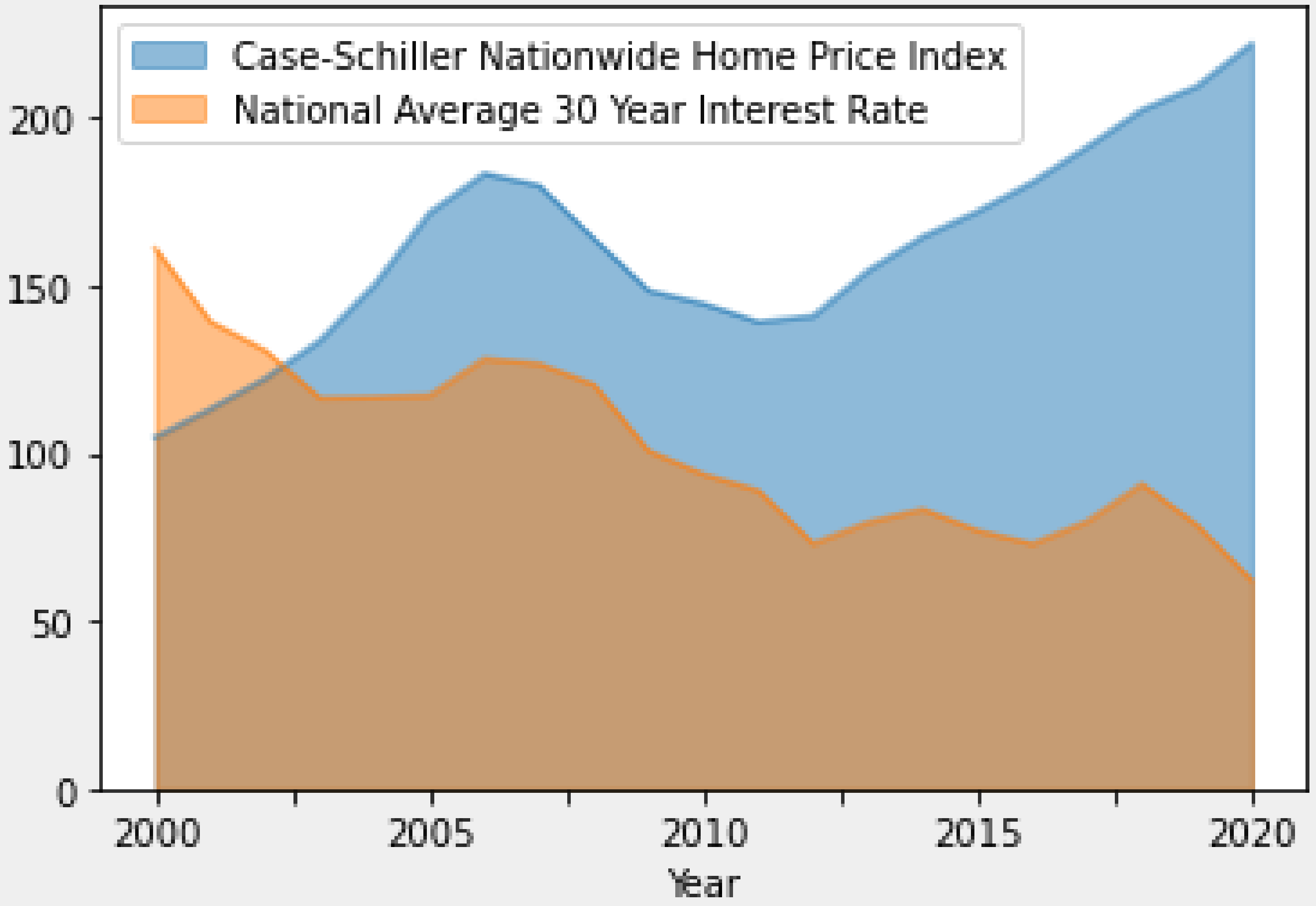
TREND 5

Interest Rate Changes

The average Interest rate charged for home loans

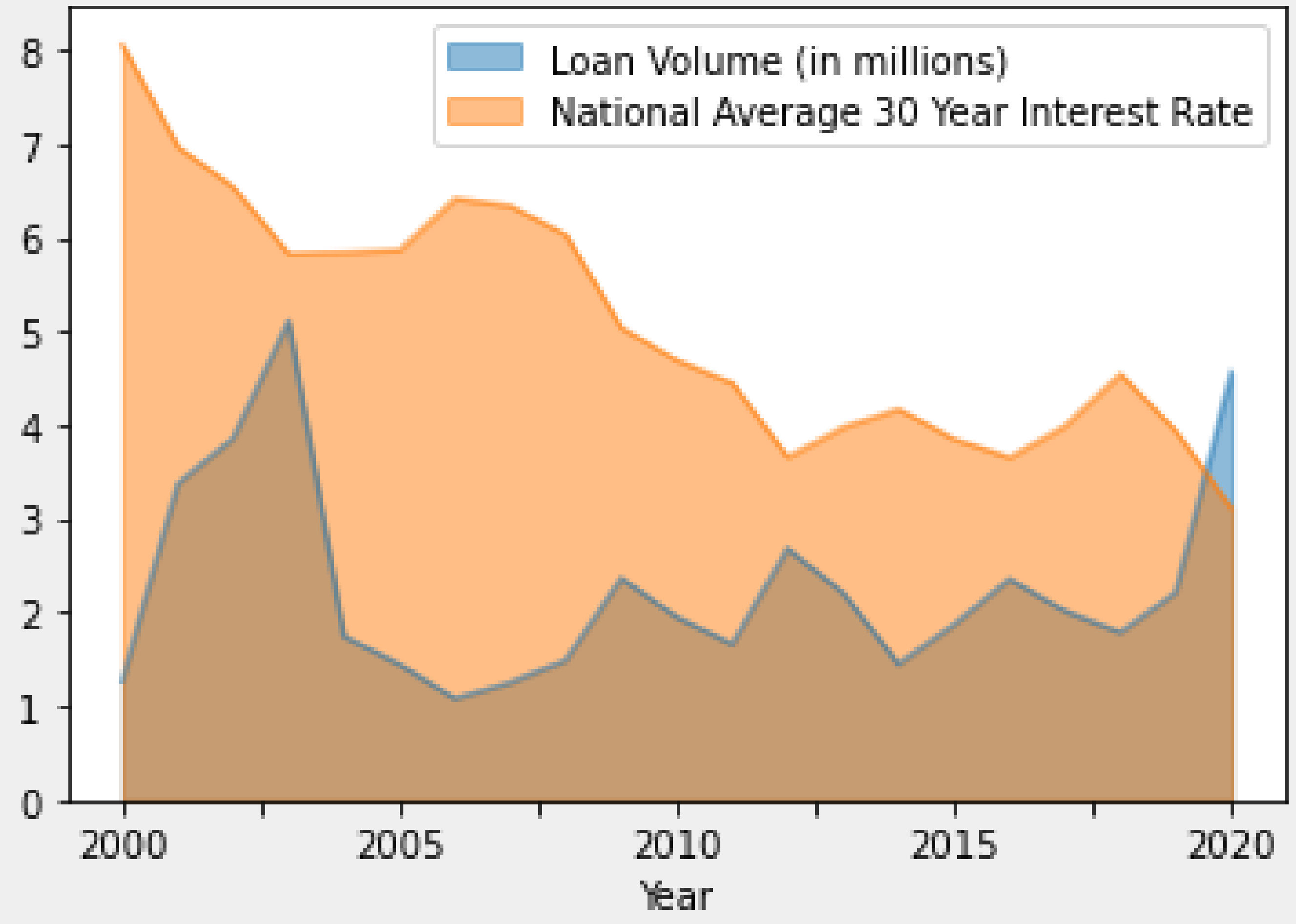
#5 INTEREST RATE TO HOME PRICES

Although It Is asumed that lower Interest rates help homebuyers this Is mostly true to wealthier home buyers or existing home owners as lower Interest rates drive up home prices.



#1 TOTAL LOAN VOLUME TO INTEREST RATE

Inverse relationship between loan rates and volume of loans. As rates decrease the amount of loan Increase.

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                                        LOAN VOLUME (IN MILLIONS)  \
LOAN VOLUME (IN MILLIONS)                                1.000000
NATIONAL AVERAGE 30 YEAR INTEREST RATE                  -0.134751

                                        NATIONAL AVERAGE 30 YEAR INTEREST RATE
LOAN VOLUME (IN MILLIONS)                                            -0.134751
NATIONAL AVERAGE 30 YEAR INTEREST RATE                                1.000000
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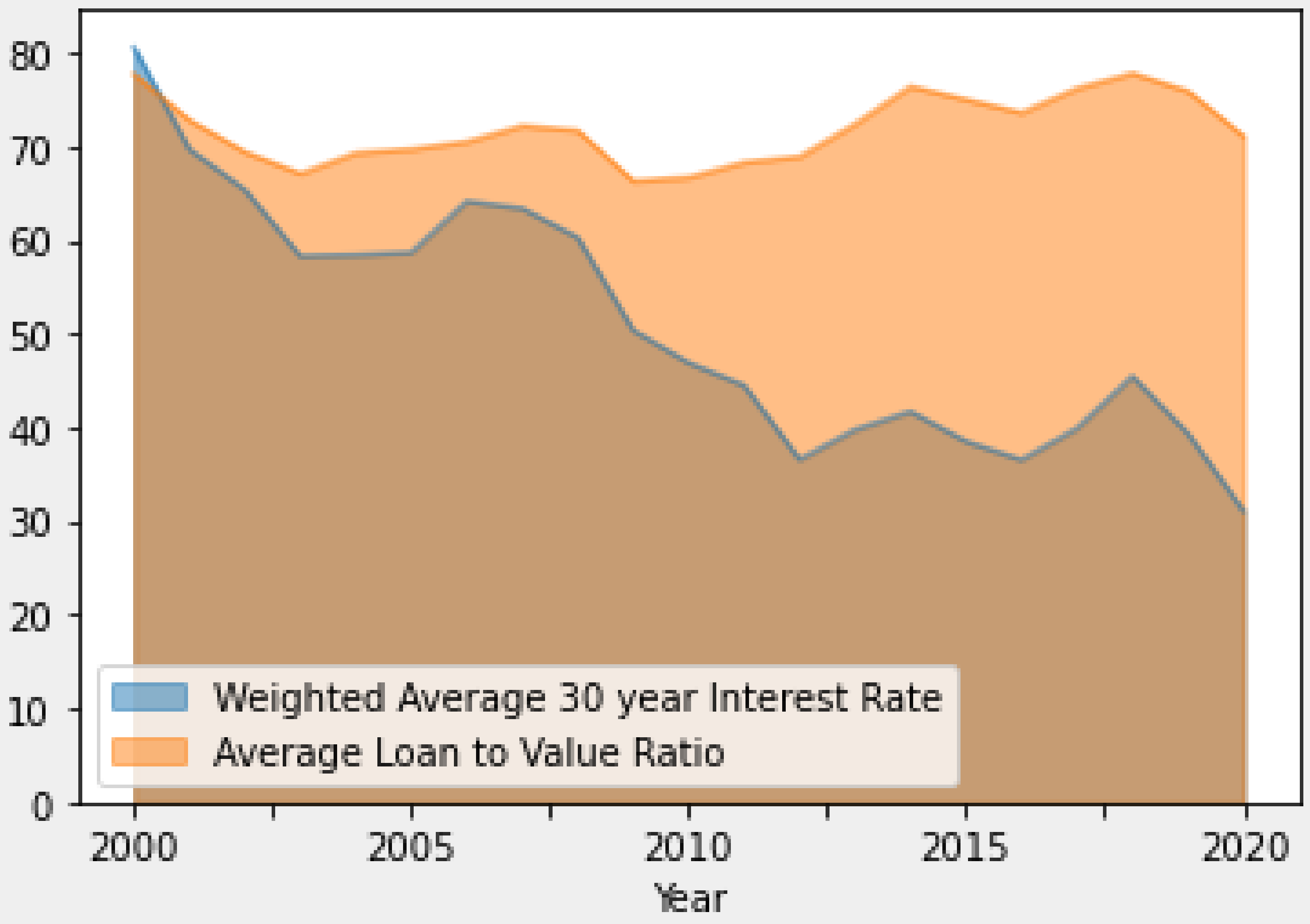
#10 PERCENTAGE OF LOAN PAID BEFORE THE END OF THE LOAN TERM AS INTEREST RATES CHANGE

We expected to see a larger Inverse correlation of those prepaying their loans (paying off or refinancing) as rates decrease but this correlation was very small.



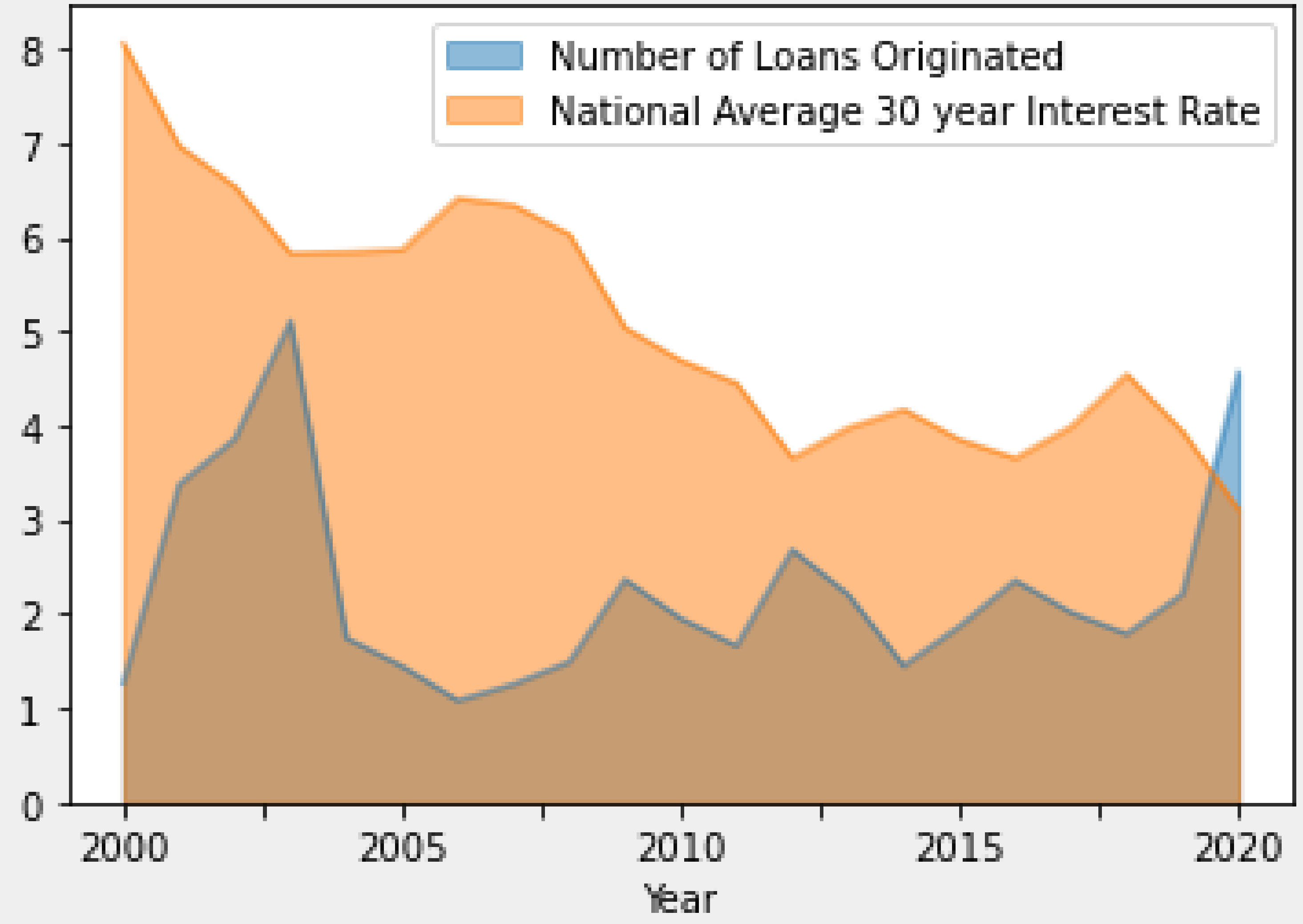
TREND 8

Number of New Loans

Gross number of new loans

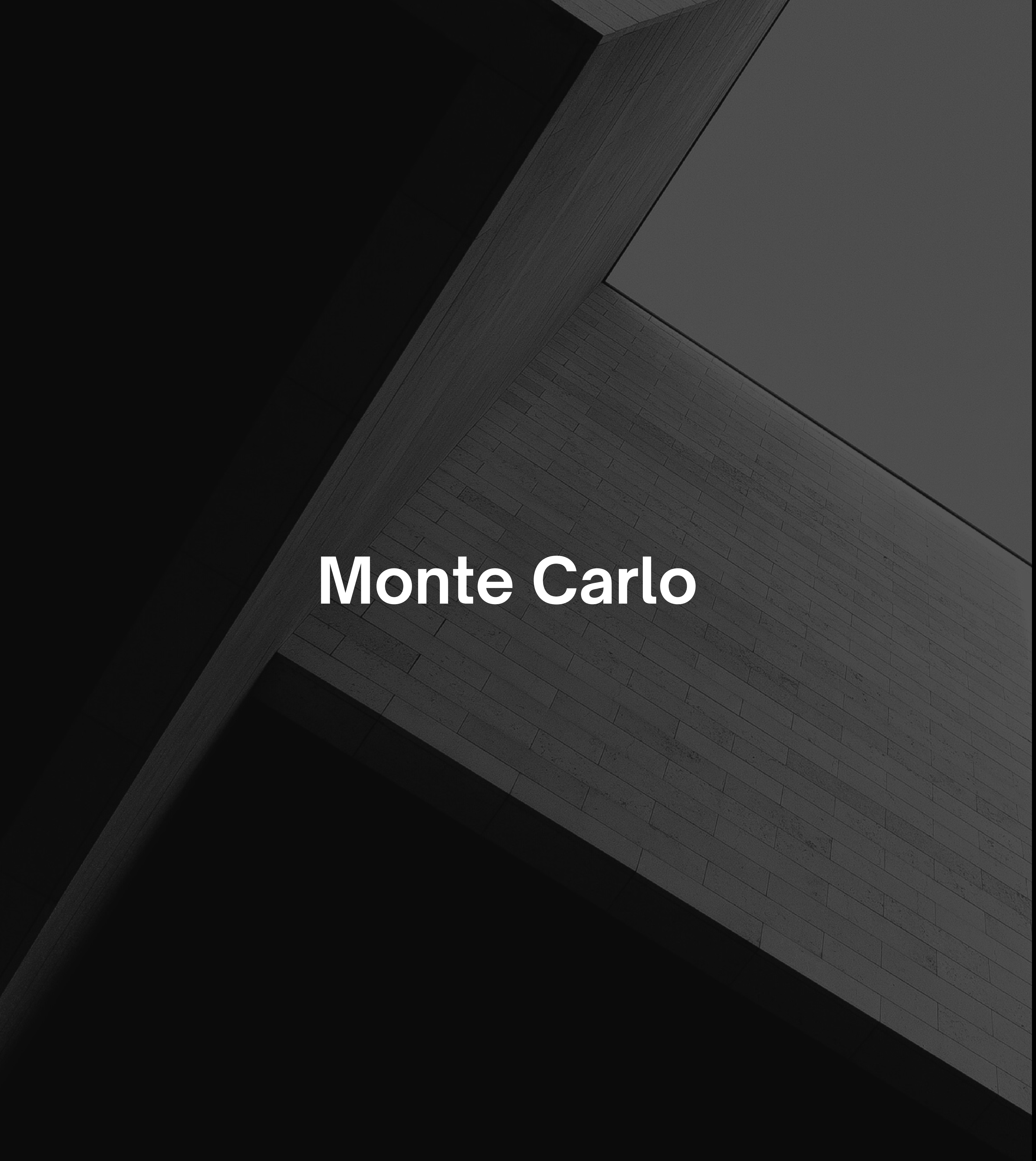
#9 INTEREST RATE TO NUMBER OF LOANS

Although we anticipated a much higher negative correlation. There Is a small correlation where when rates rise the number of loans taken decreases. We see the reason as higher rates make less people able to afford the monthly mortgage payments.



Period Correlatoins

Basic Observations

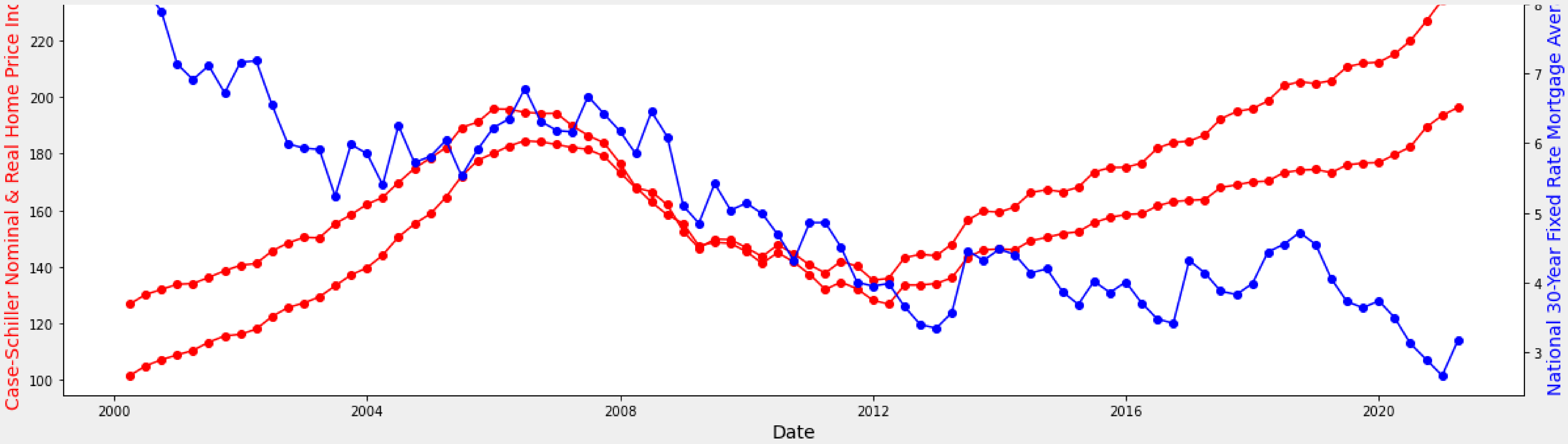


Monte Carlo

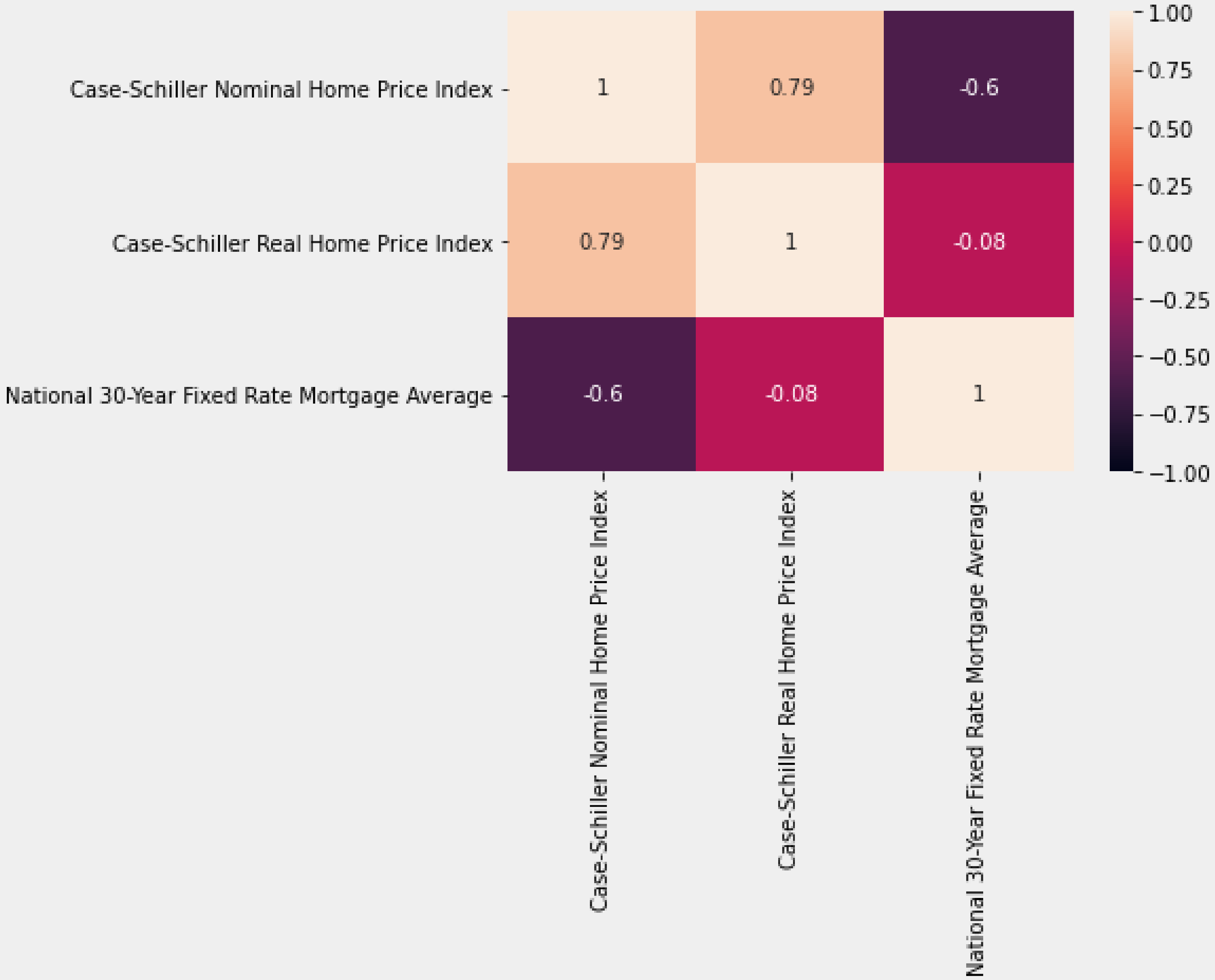
Monte Carlo simulations allow us to simulate cumulative returns over a set period.

QUANDL API

Observe Case-Schiller Home Price Index and the National Average Interest Rates to see as Interest rates fall home prices Increase leading up to 2008 and we are seeing a similar pattern leading up to the current year.



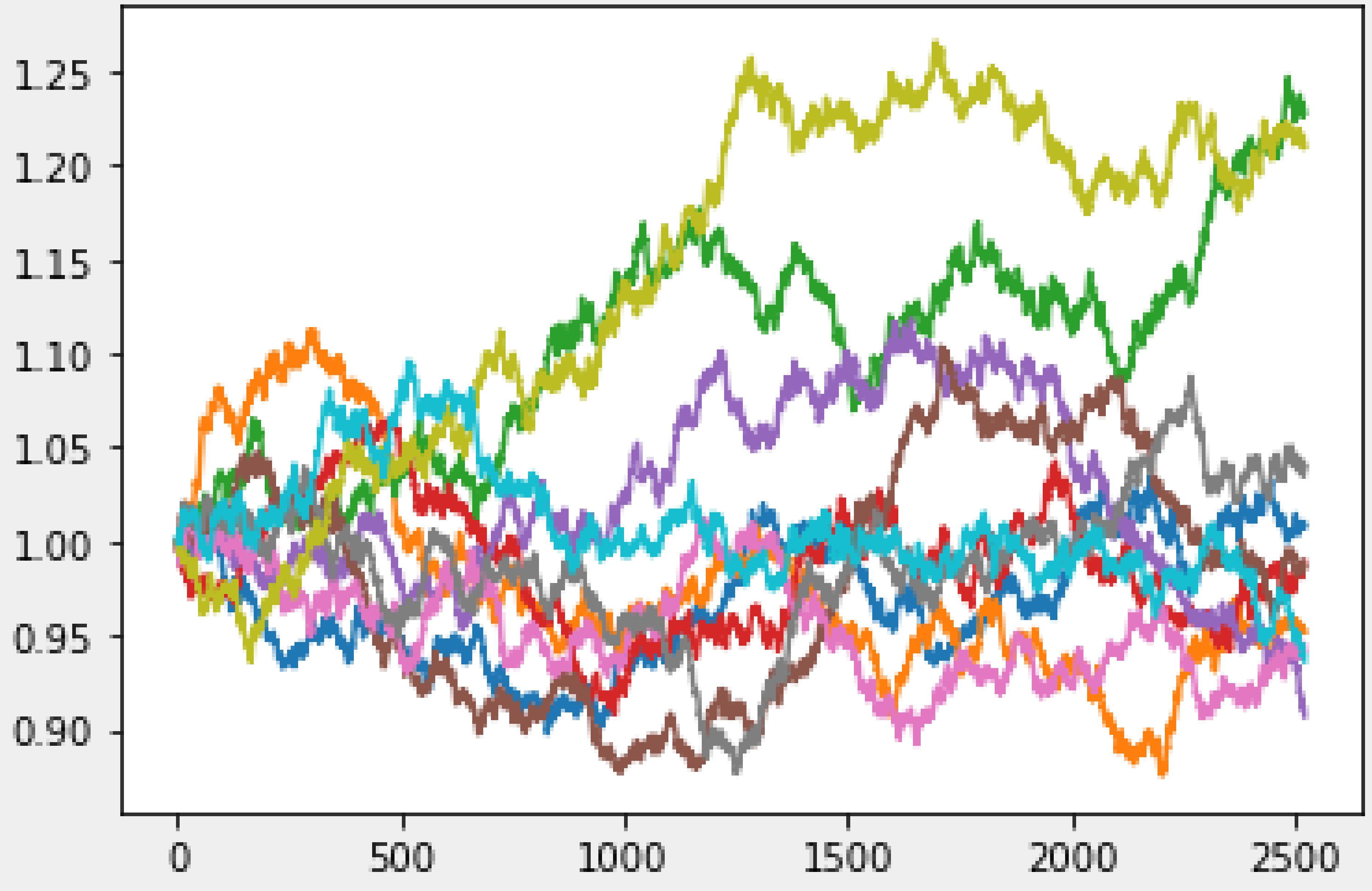
MONTE CARLO 1



MONTE CARLO 2

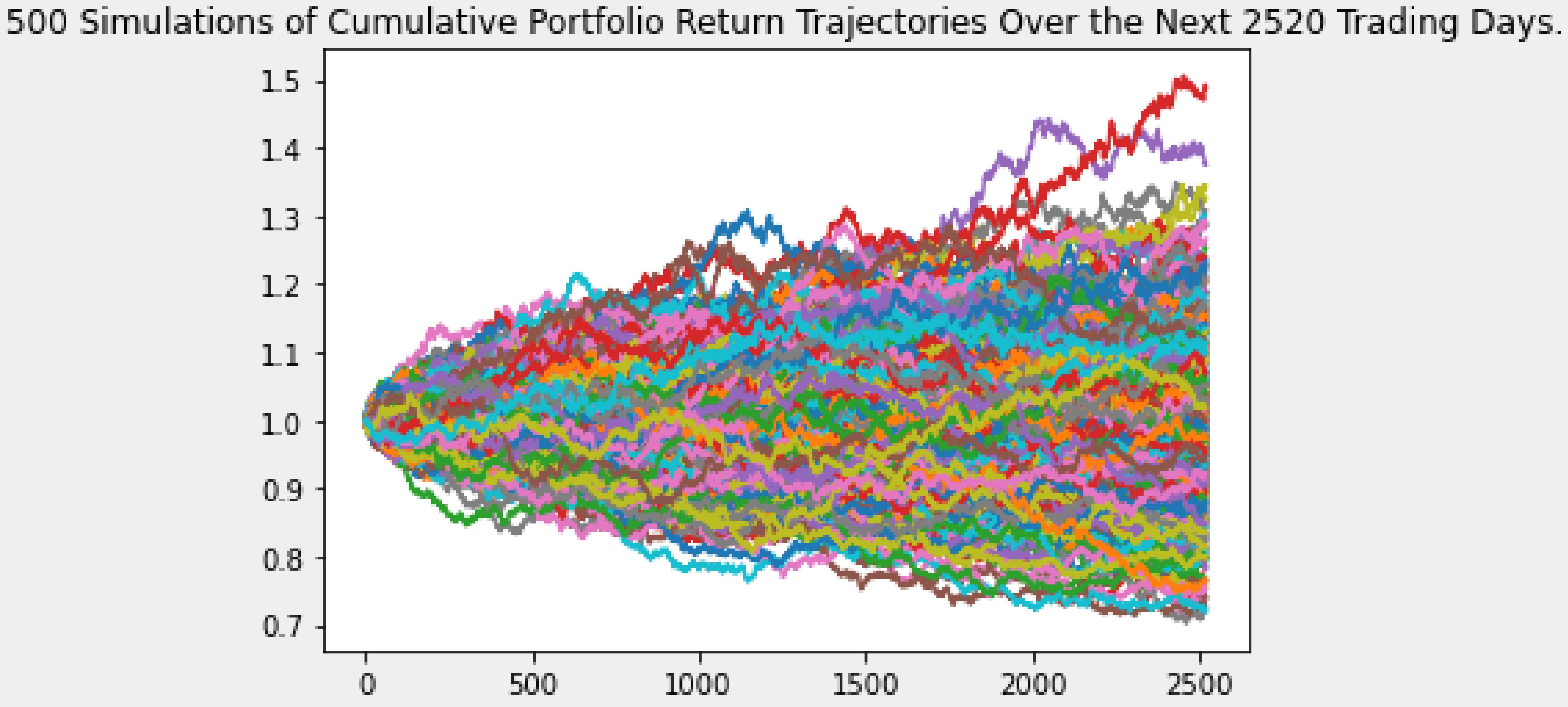
Simulation Test

10 Simulations of Cumulative Portfolio Return Trajectories Over the Next 2520 Trading Days.



MONTTE CARLO 2

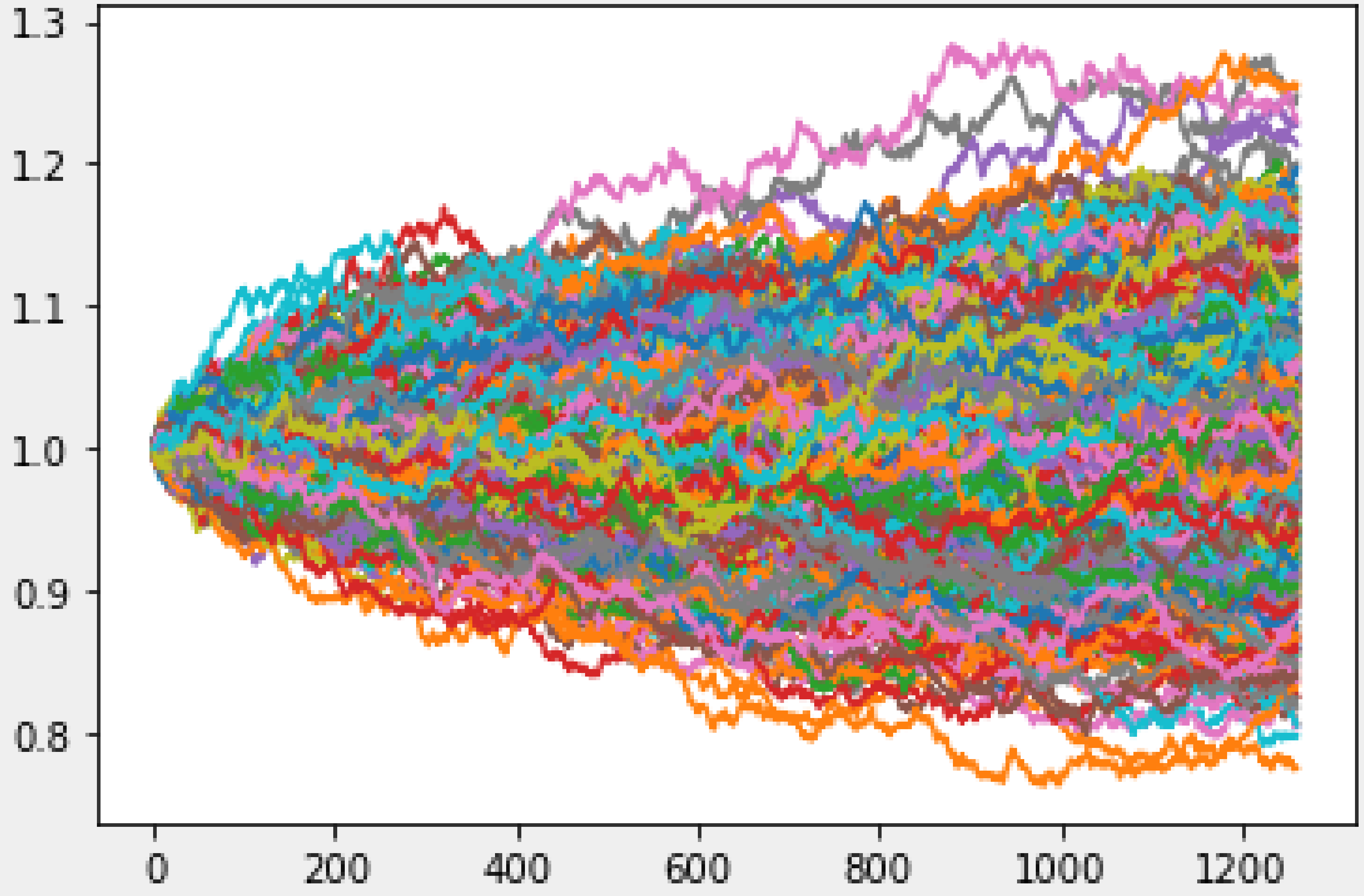
We created a portfolio of the four largest mortgage backed securities ETFs and simulated their returns to show this trend



MONTE CARLO 3

This visual shows stagnating returns for mortgage backed securties, which we argue is due to low interest rates

500 Simulations of Cumulative Portfolio Return Trajectories Over the Next 1260 Trading Days.



Libraries Used:

Pandas, Matplotlib, Seaborn, Plotly Express & Alpaca Trade API

Summary

In reviewing the data provided we can see some trends that lead up to the 2008 housing market correction. As a lender who services some of our own loans, it Is our goal to mitigate risk and reduce our exposure to non performing assets. With this data we are proposing changes to our lending policy to prepare for ecomic changes.

Policy Reccomendations

- Decrease loan to value limits In anticipation of decreases asset prices
- Adjust debt to income limits in anticipation of a housing market correction.
- Limit relationship with real estate investors to mitigate adverse exposure speculation based losses
- Limit origination of cash out refinances in anticipation of correction which could leave borrowers underwater.

Questions